

23 S1 Q1

Solution

(a) $\left[\frac{1}{3} \frac{1}{3} \frac{1}{3} \right]$ padding : 1

0	3	0	0	0	0	0
3	9	3	3	3	9	3
0	3	0	0	0	0	0
0	3	0	0	0	0	0
0	9	0	0	3	9	3
0	3	0	0	3	9	3
0	3	0	0	3	3	3

0	3	0	0	0	0	0
3	9	3	3	3	9	3
0	3	0	0	0	0	0
0	3	0	0	0	0	0
0	9	0	3	9	3	3
0	3	0	3	9	3	3
0	3	0	3	3	3	3

1 1 1 0 0 0 0
 4 5 5 3 5 5 4
 1 1 1 0 0 0 0
 1 1 1 0 0 0 0
 3 3 3 1 4 5 4
 1 1 1 1 4 5 4
 1 1 1 1 2 3 2

(b) median filter

0	3	0	0	0	0	0
3	9	3	3	3	9	3
0	3	0	0	0	0	0
0	3	0	0	0	0	0
0	9	0	0	3	9	3
0	3	0	0	3	9	3
0	3	0	0	3	3	3

0	3	0	0	0	0	0
3	9	3	3	3	9	3
0	3	0	0	0	0	0
0	3	0	0	0	0	0
0	9	0	0	3	9	3
0	3	0	0	3	9	3
0	3	0	0	3	3	3

0 0 0 0 0 0 0
 3 3 3 3 3 3 3
 0 0 0 0 0 0 0
 0 0 0 0 0 0 0
 0 0 0 0 3 3 3
 0 0 0 0 3 3 3
 0 0 0 0 3 3 3

c) g_1 ① reduce random noise

② but blur sharp edges, such as vertical line

g_2 ① remove "salt-and-pepper" noise

② preserves edge

③ however, the vertical line is missing